

NITROGEN (FIXED)—AMMONIA

(Data in thousand metric tons of nitrogen unless otherwise noted)

Domestic Production and Use: Ammonia was produced by 13 companies at 31 plants in 15 States in the United States during 2016; 2 additional plants were idle for the entire year. About 60% of total U.S. ammonia production capacity was located in Louisiana, Oklahoma, and Texas because of their large reserves of natural gas, the dominant domestic feedstock for ammonia. In 2016, U.S. producers operated at about 80% of rated capacity. The United States was one of the world's leading producers and consumers of ammonia. Urea, ammonium nitrate, ammonium phosphates, nitric acid, and ammonium sulfate were, in descending order of importance, the major derivatives of ammonia produced in the United States.

Approximately 88% of apparent domestic ammonia consumption was for fertilizer use, including anhydrous ammonia for direct application, urea, ammonium nitrates, ammonium phosphates, and other nitrogen compounds. Ammonia also was used to produce explosives, plastics, synthetic fibers and resins, and numerous other chemical compounds.

Salient Statistics—United States:	2012	2013	2014	2015	2016^e
Production	18,730	19,170	19,330	9,590	9,800
Imports for consumption ²	5,170	4,960	4,150	4,320	3,930
Exports ²	31	196	111	93	160
Consumption, apparent	13,900	13,900	13,300	13,700	13,600
Stocks, producer, yearend	180	4240	280	420	440
Price, dollars per short ton, average, f.o.b. Gulf Coast ³	579	541	531	481	270
Employment, plant, number ^e	1,100	1,200	1,200	1,200	1,200
Net import reliance ⁴ as a percentage of apparent consumption	37	34	30	30	28

Recycling: None.

Import Sources (2012–15): Trinidad and Tobago, 61%; Canada, 19%; Russia, 7%; Ukraine, 5%; and other, 8%.

Tariff: Item	Number	Normal Trade Relations 12–31–16
Ammonia, anhydrous	2814.10.0000	Free.
Urea	3102.10.0000	Free.
Ammonium sulfate	3102.21.0000	Free.
Ammonium nitrate	3102.30.0000	Free.

Depletion Allowance: Not applicable.

Government Stockpile: None.

Events, Trends, and Issues: The Henry Hub spot natural gas price ranged between about \$1.54 and \$3.29 per million British thermal units for most of the year, with an average of about \$2.60 per million British thermal units. Natural gas prices in 2016 were relatively stable; slightly higher prices were a result of increased demand for natural gas owing to cold temperatures and associated increased demand for power generation. The weekly average Gulf Coast ammonia price was \$420 per short ton at the beginning of 2016 and decreased to \$208 per short ton in October. The average ammonia price for 2016 was estimated to be about \$270 per short ton. Declining global raw material costs, such as low prices of domestic natural gas and coal in China, resulted in the lower fertilizer prices in 2016. The U.S. Department of Energy, Energy Information Administration, projected that Henry Hub natural gas spot prices would average \$3.12 per million British thermal units in 2017.

A long period of stable and low natural gas prices in the United States has made it economical for companies to upgrade existing ammonia plants and plan for the construction of new nitrogen projects. During the next 4 years, it is expected that about 3.0 million tons of annual production capacity will be added in the United States. The additional capacity will reduce, but likely not eliminate, ammonia imports.

Global ammonia capacity is expected to increase by 10% during the next 4 years. Capacity additions are expected in Africa, Asia (except East Asia), and Eastern Europe. For the first time in a decade, capacity in East Asia will not see any increase, a result of China removing small- to medium-size nitrogen facilities and canceling planned nitrogen projects.

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Large corn plantings increase the demand for nitrogen fertilizers. According to the U.S. Department of Agriculture, U.S. corn growers planted 38 million hectares of corn in the 2016 crop year (July 1, 2015, through June 30, 2016), which was 6% more than the area planted in 2015. Corn acreage in the 2017 crop year is expected to increase or remain the same in most States because of anticipated higher returns for corn compared with other crops. The largest increases in corn acreage are expected in Illinois, Iowa, Kansas, and North Dakota.

World Ammonia Production and Reserves:

	Plant production		Reserves ⁵
	2015	2016 ^e	
United States	9,590	9,800	Available atmospheric nitrogen and sources of natural gas for production of ammonia are considered adequate for all listed countries.
Algeria	1,000	1,000	
Australia	1,300	1,300	
Belarus	1,060	1,100	
Canada	4,000	4,000	
China	46,000	46,000	
Egypt	2,200	2,200	
France	2,600	2,600	
Germany	2,500	2,500	
India	10,800	11,000	
Indonesia	5,000	5,000	
Iran	2,500	2,500	
Malaysia	1,000	1,000	
Mexico	1,100	1,100	
Netherlands	1,800	1,800	
Oman	1,700	1,700	
Pakistan	2,700	2,700	
Poland	2,100	2,100	
Qatar	3,050	3,000	
Russia	12,000	12,000	
Saudi Arabia	4,100	4,100	
Trinidad and Tobago	4,700	4,700	
Ukraine	2,400	2,400	
United Kingdom	1,100	1,100	
Uzbekistan	1,200	1,200	
Venezuela	1,000	1,000	
Other countries	<u>12,800</u>	<u>13,000</u>	
World total (rounded)	141,000	140,000	

World Resources: The availability of nitrogen from the atmosphere for fixed nitrogen production is unlimited. Mineralized occurrences of sodium and potassium nitrates, found in the Atacama Desert of Chile, contribute minimally to the global nitrogen supply.

Substitutes: Nitrogen is an essential plant nutrient that has no substitute. No practical substitutes for nitrogen explosives and blasting agents are known.

^eEstimated.

¹Source: The Fertilizer Institute; data adjusted by the U.S. Geological Survey.

²Source: U.S. Census Bureau.

³Source: Green Markets.

⁴Defined as imports – exports + adjustments for industry stock changes.

⁵See [Appendix C](#) for resource and reserve definitions and information concerning data sources.